# Journal of Catalysis

EDITORS:

*J. H. de Boer*

*P. W. Selwood*

EDITORIAL BOARD:

*Robert B. Anderson*
*Michel Boudart*
*Adalbert Farkas*
*Vladimir Haensel*
*J. Halpern*
*J. Horiuti*
*Maurice L. Huggins*
*C. Kemball*
*A. Nielsen*
*M. Prettre*
*G. C. A. Schuit*
*G.-M. Schwab*
*Z. G. Szabó*
*W. Trzebiatowski*
*Paul B. Weisz*
*M. E. Winfield*

ACADEMIC PRESS

*New York and London*

COPYRIGHT ©, 1962, BY ACADEMIC PRESS INC.

ALL RIGHTS RESERVED

NO PART OF THIS VOLUME MAY BE REPRODUCED IN ANY FORM, BY PHOTOSTAT, MICROFILM, OR ANY OTHER MEANS, WITHOUT WRITTEN PERMISSION FROM THE PUBLISHERS.

66-40104

5856-30
QD501
J77
v.1

## CONTENTS OF VOLUME 1

### Number 1, March 1962

Statement by the Editors . . . . . i

J. H. deBoer, G. M. M. Houben, B. C. Lippens, W. H. Meijs, and W. K. A. Walrave. Study of the Nature of Surfaces with Polar Molecules. I. Adsorption of Lauric Acid on Aluminum Oxides and Hydroxides . . . . . 1

J. W. Geus, A. P. P. Nobel, and P. Zwietering. The Effects of Adsorption of Gases on the Low-Field Magnetization of Nickel-on-Silica Catalysts . . . 8

D. M. Brouwer. The Mechanism of Double-Bond Isomerization of Olefins on Solid Acids . . . . . 22

Robert L. Gale, Jerzy Haber, and Frank S. Stone. Adsorption Calorimetry on Granulated Catalysts. A Study of Adsorption Processes Relating to Isopropanol Dehydrogenation . . . . . 32

P. G. Ashmore and B. J. Tyler. A Catalyzed Reaction of Hydrogen and Oxygen 39

Felix Bergmann and Hanna Ungar-Waron. On the Mechanism of the Two-Way Oxidation of 2-Chloropurine by Mammalian Xanthine Oxidase . . . . . 47

W. Keith Hall. The Formation of Cation Radicals on the Surface of Silica-Alumina Catalysts . . . . . 53

Noriaki Wakao, J. M. Smith, and P. W. Selwood. The Low-Temperature Orthohydrogen Conversion over Supported Oxides and Metals . . . . . 62

G. C. Bond, G. Webb, P. B. Wells, and J. M. Winterbottom. Patterns of Behavior in Catalysis by Metals . . . . . 74

J. J. F. Scholten and A. Van Montfoort. The Determination of the Free-Metal Surface Area of Palladium Catalysts . . . . . 85

### Number 2, May 1962

I. E. Den Besten and P. W. Selwood. The Chemisorption of Hydrogen Sulfide, Methyl Sulfide, and Cyclohexene on Supported Nickel Catalysis . . . 93

I. Batta, F. Solymosi, and Z. G. Szabó. Decomposition of Nitrous Oxide on Some Doped Cupric Oxide Catalysts . . . . . 103

L. Bachmann, E. Bechtold, and E. Cremer. Gas-Chromatographic Separation of Ortho- and Parahydrogen on Molecular Sieves: Analysis, Preparation, and Measurement of Catalytic Conversion and of Adsorption . . . . . 113

Michel Courtois and Stanislas Jean Teichner. Infrared Studies of CO, $O_2$, and $CO_2$ Gases and Their Interaction Products, Chemically Adsorbed on Nickel Oxide . . . . . 121

Juan F. García de la Banda. Semiconductivity and Catalytic Activity. The Dehydrogenation of Isopropyl Alcohol on ZnO—$CR_2O_3$ Catalysts . . . . 136

Robert G. Meisenheimer and J. Norton Wilson. Interaction of Oxygen and of Ethylene Dichloride with Silver Surfaces . . . . . 151

Herbert Koelbel, Hans-Bolko Ludwig, and Hans Hammer. Study on the Formation Mechanism of Methane by Hydrocracking in the Fischer Tropsch Synthesis . . . . . 156

H. Jarmolowicz and M. Smialowski. Effect of Catalytic Poisons on the Production of Nickel Hydride by Electrolytic Charging of Nickel with Hydrogen . 165
Hervey H. Voge and Leland T. Atkins. Uniformity of Supported CuO from Rate of Reduction with Hydrogen . . . . . 171
R. P. Eischens, W. A. Pliskin, and M. J. D. Low. The Infrared Spectrum of Hydrogen Chemisorbed on Zinc Oxide . . . . . 180

Letter to the Editors

George-Maria Schwab and Volkmar Leute. Decomposition of Formaldoxime by Oxide Catalysts . . . . . 192

Abstracts from Kinetics and Catalysis, Academy of Science, U.S.S.R., Vol. III, Issue 1, Jan.–Feb., 1962 . . . . . 194

Number 3, June 1962

Juro Horiuti. Significance and Experimental Determination of Stoichiometric Number . . . . . 199
R. Suhrmann, H. J. Heyne, and G. Wedler. On the Energetic Heterogeneity of Clean Evaporated Nickel Films Studied by Means of the Place Change Between Adsorbed Isotopic CO Molecules . . . . . 208
Alcuin F. Gremillion and Walter R. Knox. The Oxidation and Leaching of Some Chromia-Alumina and Chromia-Silica-Alumina Preparations . . . 216
A. K. Galwey. A Kinetic Investigation of the Reaction of Nickel Carbide with Hydrogen . . . . . 227
A. J. deRosset, C. G. Finstrom, and C. J. Adams. Adsorption of $H_2S$ on Alumina at Low Coverages . . . . . 235
Alfred Clark, V. C. F. Holm, and D. M. Blackburn. The Nature of Silica-Alumina Surfaces. I. Thermodynamics of Adsorption of Ammonia . . . 244
F. G. Gault, J. J. Rooney, and C. Kemball. The Catalytic Exchange with Deuterium of Polymethylcyclopentanes on Metal Films. Evidence for $\pi$-Bonded Intermediates . . . . . 255
A. Cimino, E. Molinari, F. Cramarossa, and G. Ghersini. Hydrogen Chemisorption and Electrical Conductivity of Zinc Oxide Semiconductors . . . . . 275
S. K. Bhattacharyya and A. K. Kar. Catalytic Vapor Phase Oxidation of Crotonaldehyde to Maleic Acid in a Fluidized Bed . . . . . 293

Number 4, August 1962

V. J. Frilette, P. B. Weisz, and R. L. Golden. Catalysis by Crystalline Aluminosilicates. I. Cracking of Hydrocarbon Types over Sodium and Calcium "X" Zeolites . . . . . 301
P. B. Weisz, V. J. Frilette, R. W. Maatman, and E. B. Mower. Catalysis by Crystalline Aluminosilicates. II. Molecular-Shape Selective Reactions . . 307
Herman Pines and Sigmund M. Csicsery. Alumina: Catalyst and Support. XVI. Aromatization and Dehydroisomerization of Branched $C_6$—$C_8$ Hydrocarbons over "Nonacidic" Chromia-Alumina Catalyst . . . . . 313
Sigmund M. Csicsery and Herman Pines. Alumina: Catalyst and Support. XVII. Dehydrocracking of Hydrocarbons over "Nonacidic" Chromia-Alumina Catalyst . . . . . 329

C. R. Adams, H. A. Benesi, R. M. Curtis, and R. G. Meisenheimer. Particle Size Determination of Supported Catalytic Metals: Platinum on Silica Gel . 336
R. J. Mikovsky and P. B. Weisz. Induction of Catalytic Activity by Neutron Irradiation of Silica and Silica-Alumina . . . . . 345
Mordechai L. Kremer. The Promoting Effect of Cupric Ions on the Ferric Ion Catalyzed Decomposition of Hydrogen Peroxide . . . . . 351
R. G. Meisenheimer. A Mechanism for the Deactivation of Trace Metal Contaminants of Cracking Catalysts . . . . . 356
P. M. Gundry, J. Haber and F. C. Tompkins. Surface Potential Measurements on Nickel and Iron Films During the Chemisorption of Ammonia, Nitrogen, and Hydrogen . . . . . 363
D. M. Brouwer. Oxidation of Aromatic Hydrocarbons by Silica-Alumina . . 372
F. E. Shephard, J. J. Rooney, and C. Kemball. The Polymerization of Propylene on Silica-Alumina . . . . . 379

Notes

Donald N. Fletcher and Howard F. Rase. The Promoting Effect of Chromium on a Sprayed-Nickel Catalyst . . . . . 389
R. B. Anderson. A Theorem Regarding the Poisoning of Fixed Catalyst Beds . . . . . 393

Abstracts from Kinetics and Catalysis, Vol. III, Issue 2, March–April 1962, pp. 175–180 . . . . . 395

Number 5, October 1962

P. B. Weisz and A. B. Schwartz. Diffusivity of Porous-Oxide-Gel-Derived Catalyst Particles . . . . . 399
Charles P. Poole, Jr., W. L. Kehl, and D. S. MacIver. Physical Properties of Coprecipitated Chromia-Alumina Catalysts . . . . . 407
W. J. M. Rootsaert, L. L. van Reijen, and W. M. H. Sachtler. Field-Emission Study of Composite Adsorption Layers on Tungsten and Platinum . . . 416
R. Haul and D. Blennemann. Kinetics of Isotope Exchange between Hydrogen and Liquid Ammonia on Heterogeneous Catalysts . . . . . 432
J. R. Anderson, B. G. Baker, and J. V. Sanders. Structure and Properties of Evaporated Metal Films . . . . . 443
F. Ricca, A. G. Nasini, and G. Saini. Successive Adsorption of Gases on Tungsten. Nitrogen and Carbon Monoxide at Room Temperature . . . . . 458
F. Solymosi and E. Krix. Catalysis of Solid Phase Reactions. Effect of Doping of Cupric Oxide Catalyst on the Thermal Decomposition and Explosion of Ammonium Perchlorate . . . . . 468

Note

J. H. Sinfelt, H. Hurwitz, and J. C. Rohrer. Role of Dehydrogenation Activity in the Catalytic Isomerization and Dehydrocyclization of Hydrocarbons . . . . . 481

Abstracts from Kinetics and Catalysis, Vol. III, Issue 3, May–June, 1962, pp. 305–313 . . . . . 484

B. de Vries. Reactions of the Pentacyanocobaltate (II) Ion. II. Liquid Phase Hydrogenation and Decomposition . . . . . 489

Joseph C. Kuriacose and M. Clare Markham. Conversion of Isopropyl Alcohol to Acetone on Irradiated Zinc Oxide . . . . . 498

I. Pasquon and M. Dente. Heat and Mass Transfer in Methanol Synthesis—Optimum Operating Conditions of the Reactors . . . . . 508

George Simkovich and Carl Wagner. The Role of Ionic Point Defects in the Catalytic Activity of Ionic Crystals . . . . . 521

James Wei. Intraparticle Diffusion Effects in Complex Systems of First Order Reactions. I. The Effects in Single Particles . . . . . 526

James Wei. Intraparticle Diffusion Effects in Complex Systems of First Order Reactions. II. The Influence of Diffusion on the Performance of Chemical Reactors . . . . . 538

D. Basmadjian, G. N. Fulford, B. I. Parsons, and D. S. Montgomery. The Control of the Pore Volume and Pore Size Distribution in Alumina and Silica Gels by the Addition of Water Soluble Organic Polymers . . . . . 547

Book Review . . . . . 564

Abstracts from Kinetics and Catalysis, Vol. III, Number 4, July–August, 1962, pp. 470–480 . . . . . 566

Author Index . . . . . 570

Subject Index . . . . . 572